

INCH-POUND

MIL-PRF-1/480D
12 October 1998
SUPERSEDING
MIL-E-1/480C
17 September 1971

PERFORMANCE SPECIFICATION SHEET

ELECTRON TUBES, CATHODE RAY

TYPES 5SP1A, 5SP7A AND 5SP11A (1/)

This specification is approved for use by all Departments and Agencies of the Department of Defense.

The requirements for acquiring the electron tube described herein shall consist of this document and the latest issue of MIL-PRF-1.

DESCRIPTION: Electrostatic deflection and focus with dual gun.

DIMENSIONS AND PIN CONNECTIONS: See figure 1.

ABSOLUTE RATINGS:

Parameter:	Type phosphor	Ef	Ec1	ed	Eb1	Eb2	Eb3	Rg	Zd	Eb3/Eb2	Alt
Unit:		V	V dc	V dc	V dc	V dc	V dc	Meg	Meg	Ratio	ft
Maximum:	All	6.9	0	600	1,100	2,750	8,250	1.5	1.0	3	50,000
Minimum:	All	5.7	-200	---	---	1,000	1,000	---	---	---	---
Test conditions: See note 2	P1A, P11A	6.3	Adj	---	Focus	1,500	3,000	---	---	---	---
	P7A	6.3	Adj	---	Focus	2,000	4,000	---	---	---	---

GENERAL:

Qualification - Required.

1/ See note 10

TABLE I. Testing and inspection.

Inspection	Method	Type	Conditions	Symbol	Limits Min	Limits Max	Unit
<u>Qualification inspection</u>							
Pressure (implosion)	1141	All		---	---	---	---
Barometric pressure, reduced	1002	All		---	---	---	---
Vibration	5111	All		Width	---	1	mm
Direct-interelectrode capacitance	1331	All	k to all	Ck	---	5.0	pF
			g1 to all	Cg1	---	6.6	pF
			D1 to D2	C1D2	---	2.0	pF
			D3 to D4	C3D4	---	2.3	pF
			D1 to all except D2	C	---	2.3	pF
			D2 to all except D1	C	---	3.0	pF
			D3 to all except D4	C	---	3.0	pF
			D4 to all except D3	C	---	2.8	pF
Neck and bulb alignment (electrostatic types)	5101	All		Dia	---	3.5	inch
Cathode illumination	5216	All		---	---	---	---
Focusing voltage (zero-bias)	5246	P1A, P11A P7A		Eb1	272	521	V dc
				Eb1	363	695	V dc
Deflection factor	5248	P1A, P11A P7A	1D2; Eb3 = Eb2 = 1,500 V dc	DF	49	61	V dc/in.
			1D2; Eb3 = Eb2 = 2,000 V dc	DF	65	81	V dc/in.
Deflection factor	5248	P1A, P11A P7A	3D4; Eb3 = Eb2 = 1,500 V dc	DF	43	53	V dc/in.
			3D4; Eb3 = Eb2 = 2,000 V dc	DF	57	71	V dc/in.
Deflection-factor uniformity	5248	All		---	---	2	%
Base material insulating quality	1216	All	Zone 5, or higher	---	---	---	---

See notes at end of table I.

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TABLE I. Testing and inspection -Continued.

Inspection	Method	Type	Conditions	Symbol	Limits Min	Limits Max	Unit
<u>Conformance inspection, part 1</u>							
Voltage breakdown	5201	All		---	---	---	---
Voltage breakdown (electrostatic types)	5201	All		---	---	---	---
Gas "cross"	5206	P1A	Light = 10 ftL (see note 1)	---	---	---	---
		P7A	Ib3 = 25 μ A dc (see note 1)	---	---	---	---
		P11A	Light = 4.5 ftL (see notes 1 and 3)	---	---	---	---
Bulb, screen and faceplate quality	5106	All		---	---	---	---
Modulation	5223	P1A	Light = 10 ftL	ΔE_c	---	32	V dc
		P7A	Ib3 = 25 μ A dc	ΔE_c	---	42	V dc
		P11A	Light = 4.5 ftL (see note 3)	ΔE_c	---	32	V dc
Light output	5221	P1A	(see note 1)	Light	10	---	ftL
		P11A	(see notes 1 and 3)	Light	4.5	---	ftL
Spot position (electrostatic deflection)	5231	All	(see note 5)	---	---	16	mm
Spot displacement (leakage)	5231	All		Displ	---	10	mm
Grid-cutoff voltage	5241	P1A, P11A		E_{c1}	-34	-56	V dc
		P7A		E_{c1}	-45	-75	V dc
Pattern distortion	5103	All	(see note 7)	---	---	---	---
Grid No. 1 leakage current	5251	All		---	---	---	---
Anode No. 2 leakage current	5251	All		---	---	---	---
<u>Conformance inspection, part 2</u>							
Secureness of base, cap or insert	1101	All		---	---	---	---
Heater current	1301	All		If	540	660	mA
Electrode current (anode No. 1)	5201	All	$E_{c1} = 0$	Ib1	-50	10	μ A dc

See notes at end of table I.

TABLE I. Testing and inspection -Continued.

Inspection	Method	Type	Conditions	Symbol	Limits Min	Limits Max	Unit
<u>Conformance inspection, part 2 -Continued</u>							
Electrode current (cathode)	5201	P1A	Light = 10 ftL	Ik	---	1,000	μA dc
		P7A	Ib3 = 25 μA dc	Ik	---	1,000	μA dc
		P11A	Light = 4.5 ftL (see note 3)	Ik	---	1,000	μA dc
Base alignment (electrostatic types)	5101	All	+4D3, pin No. 4	---	---	---	---
Side terminal alignment (electrostatic types)	5101	All	+4D3	---	---	---	---
Angle between traces	5101	All		---	---	---	---
Trace alignment	---	All	(see note 4)	---	---	---	---
Neck and base alignment (electrostatic types)	5101	All		---	---	---	---
Base pin solder depth	1111	All		---	---	---	---
Stray light emission (conventional types)	5216	All	Eb2 = 2,750 V dc Eb3 = 8,250 V dc	---	---	---	---
Screen	5221	P7A		---	---	---	---
Line width "A" (electrostatic deflection)	5226	P1A	Light = 10 ftL	Width	---	0.69	mm
		P7A	Ib3 = 25 μA dc	Width	---	0.69	mm
		P11A	Light = 4.5 ftL (see note 3)	Width	---	0.69	mm
Line width "B" (electrostatic deflection)	5226	P1A	Light = 10 ftL	Width	---	0.69	mm
		P7A	Ib3 = 25 μA dc	Width	---	0.69	mm
		P11A	Light = 4.5 ftL (see note 3)	Width	---	0.69	mm
Focusing voltage at cutoff	5246	P1A, P11A		Eb1	345	518	V dc
		P7A		Eb1	460	690	V dc
Deflection factor	5248	P1A, P11A	1D2	DF	62	76	V dc/in.
		P7A	1D2	DF	83	101	V dc/in.
Deflection factor	5248	P1A, P11A	3D4	DF	53	65	V dc/in.
		P7A	3D4	DF	70	86	V dc/in.
Deflection factor ratio	---	All	(see note 6)	---	---	---	---

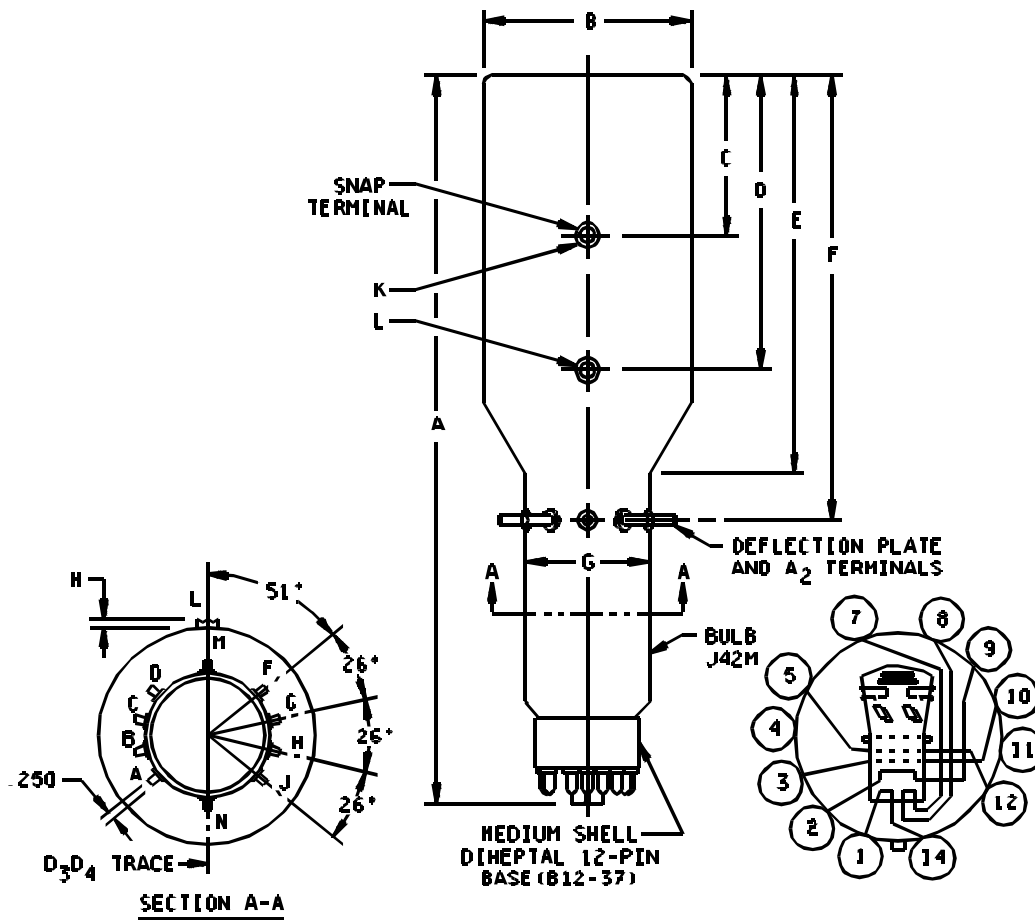
See notes at end of table I.

TABLE I. Testing and Inspection -Continued.

Inspection	Method	Type	Conditions	Symbol	Limits Min	Limits Max	Unit
<u>Conformance inspection, part 2</u> <u>-Continued</u>							
Interaction factor	- - -	All	(see note 8)	- - -	- - -	- - -	- - -
Heater-cathode leakage current	5251	All		- - -	- - -	- - -	- - -
Permanence of marking	1105	All		- - -	- - -	- - -	- - -
<u>Conformance inspection, part 3</u>							
Life test	- - -	All	Group C; Ib3 = 15 μ A dc; Eb2 = 2,750 V dc; Eb3 = 8,250 V dc	t	500	- - -	hrs
Life-test end points:	- - -	P1A	Light = 7.5 ftL	- - -	- - -	- - -	- - -
		P11A	Light = 3.5 ftL	- - -	- - -	- - -	- - -
		P7A	(see note 3) Ib3 = 20 μ A dc	- - -	- - -	- - -	- - -
Modulation		P1A, P11A		Δ Ec1	- - -	32	V dc
Modulation		P7A		Δ Ec1	- - -	42	V dc
Line width "A"		All		Width	- - -	0.69	mm
Line width "B"		All		Width	- - -	0.69	mm

NOTES:

1. This test to be performed at the conclusion of the holding period.
2. All electrical tests are to be made on each gun separately.
3. As measured with a 2 inch x 2 inch (50.8 x 50.8 mm) raster using type 3 photronic cell without eye correction, calibrated in footcandles of illumination from a light source having a color temperature of 2700°K.
4. Corresponding traces of each gun should be within 1 degree of each other.
5. Under stable operating conditions (method 5231), the position of either spot will not shift with changes in intensity by more than 0.025 inch (0.64 mm).
6. Ratio of deflection factors of corresponding sets of deflection plates (larger deflection factor divided by lower deflection factor) shall not exceed 1.15.
7. With a raster pattern the size of which is adjusted so that the widest points of the pattern just touch the sides of a square, 3.075 inches (78.11 mm) on a side, no point on these pattern sides will lie within an inscribed square, 2.925 inches (74.30 mm) on a side.
8. The deflection of one beam when balanced dc voltages are applied to the deflection electrodes of the other beam will not be greater than the indicated value.
9. Maximum voltages applied to base, deflection plates and A2 only.
10. Tube type 5SP2A has been deleted from this specification sheet.



Connections

Terminal K Intensifier Electrode
 Terminal L Accelerating Electrode Coating

Unit A

Pin No. 1. Heater
 2. Cathode
 3. Control Electrode
 4. Internal connection
 5. Focusing Electrode
 14. Heater

Terminal A Deflection Plate D2
 B Deflection Plate D1
 C Deflection Plate D3
 D Deflection Plate D4
 M Accelerating Electrode

Unit B

Pin No. 7. Heater
 8. Heater
 9. Cathode
 10. Control Electrode
 11. No connection
 12. Focusing Electrode

F Deflection Plate D1
 G Deflection Plate D2
 H Deflection Plate D4
 J Deflection Plate D3
 N Accelerating Electrode

FIGURE 1. Outline drawing of electron tube types 5SP1A, 5SP7A, and 5SP11A.

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Dimensions in inches with metric equivalents (mm) in parentheses		
Ltr	Minimum	Maximum
Conformance inspection, part 2		
A	18.000 (457.20)	18.500 (469.90)
B	5.156 (130.96)	5.344 (135.74)
C	3.750 (95.25)	4.250 (107.95)
D	7.000 (177.80)	7.500 (190.50)
F	10.750 (273.05)	11.250 (285.75)
G	2.937 (74.60)	3.062 (77.77)
Conformance inspection, part 3 (periodic check)		
BULB: J42M		
BASE: B12-37		
Reference dimensions (see note c)		
E	10.000 (254.00)	
H	0.125 (3.18) MAX	

NOTES:

1. M-N connected together internally.
2. L and M-N shall be connected together to a common ground.
3. Reference dimensions are for information only and are not required for inspection purposes.

FIGURE 1. Outline drawing of electron tube types 5SP1A, 5SP7A and 5SP11A - Continued.

Custodians:
 Army - CR
 Navy - EC
 Air Force - 85

Preparing activity:
 DLA - CC
 (Project 5960-3467-03)

Review activities:
 Navy - AS, CG, MC, OS
 Air Force - 11, 99